

## C4. CHAPTER 4

### LIFE-CYCLE RESOURCE ESTIMATES

#### C4.1. GENERAL

The Department shall consider the TOC of each acquisition program. For purposes of compliance with this Chapter and reporting costs in acquisition documents (e.g., the APB and Selected Acquisition Report (SAR)), however, use life-cycle costs as defined in DoD 5000.4-M (reference (j)).

#### C4.2. ANALYSIS OF MULTIPLE CONCEPTS

Each identified mission need has many possible concepts that will satisfy that need. Not all possible concepts can be explored in Concept Exploration. The analysis of multiple concepts is a process of looking at possible concepts and identifying those concepts that could not realistically satisfy the need at a cost and on a schedule that are acceptable to the user. The analysis of multiple concepts will aid decision-makers in placing appropriate boundaries on the type of concepts to explore.

C4.2.1. The analysis shall broadly examine each possible concept and describe the rationale for continuing interest in the concept or eliminating the concept from further consideration. The intent of the analysis shall be to define any limitations on the type of alternatives the Department of Defense will consider, while leaving the range of remaining alternatives as broad as possible, so as not to constrain innovation or creativity on the part of industry.

C4.2.2. The DoD Component(s) responding to a mission need likely to result in an ACAT I or IA program shall prepare the analysis of multiple concepts. The OIPT Leader shall review the analysis, in coordination with Program Analysis and Evaluation (PA&E) and other interested staff offices, and provide an assessment to the MDA.

#### C4.3. ANALYSIS OF ALTERNATIVES

Analyzing alternatives is part of the CAIV process. Alternatives analysis shall broadly examine multiple elements of project or program alternatives including technical risk and maturity, and costs.

C4.3.1. The analysis shall be quantitative, and induce decision makers and staffs at all levels to engage in qualitative discussions of key assumptions and variables, develop better program understanding, and foster joint ownership of the program and program decisions. There shall be a clear linkage between the analysis of alternatives, system requirements, and T&E MOEs (Pub. L. 104-106 (1996), Section 5123 (reference (e)) and 44 U.S.C. 3506 (reference

(c))). The analysis shall reveal insights into the program knowns and unknowns, and highlight relative advantages and disadvantages of the alternatives being considered. The activity conducting the analysis shall document its findings.

C4.3.2. The analysis shall include sensitivity analyses to possible changes in key assumptions (e.g., threat) or variables (e.g., selected performance capabilities). The analysis shall explicitly consider continued operating and support costs of the baseline. Where appropriate, the analysis shall address the interoperability and commonality of components or systems that are similar in function to other DoD Component programs or Allied programs (see 10 U.S.C. 2457 (reference (nnn))). For each alternative, the analysis of alternatives shall consider requirements for a new or modified IT, including a NSS, or support infrastructure.

C4.3.3. The analysis shall aid decision-makers in judging whether any of the proposed alternatives to an existing system offers sufficient military and/or economic benefit to justify the cost. For most systems, the analysis shall consider and baseline against the system(s) that the acquisition program will replace, if they exist. The analysis shall consider the benefits and detriments, if any, of accelerated and delayed introduction of military capabilities, including the effect on life-cycle costs. PA&E shall assess the analysis of alternatives in terms of its comprehensiveness, objectivity, and compliance with the Clinger-Cohen Act (reference (ppp)). PA&E shall provide the assessment to the DoD Component head or Principal Staff Assistant (PSA), and to the MDA. The PM and MDA shall consider the analysis, the PA&E assessment, and ensuing documentation at Milestone B (or C, if there is no Milestone B) for ACAT I and IA programs.

#### C4.3.4. Preparation Responsibilities

C4.3.4.1. The DoD Component, or for ACAT IA programs, the office of PSA, responsible for the mission area associated with the mission deficiency or technical opportunity normally prepares the analysis of alternatives. The Head of the DoD Component (or PSA for ACAT IA programs), or as delegated, but not the PM, shall determine the independent activity to conduct the analysis. If an analysis of alternatives IPT forms, the PM or designated representative may be a team member, but shall not be the IPT leader.

C4.3.4.2. The lead DoD Component for a joint program shall ensure a comprehensive analysis. If DoD Components supplement the lead Component's analysis, the lead Component shall ensure consistent assumptions and methodologies between the analyses.

C4.3.4.3. For ACAT ID and ACAT IAM programs, the Head of the DoD Component, PSA, or delegated official shall coordinate with the following offices early in the development of alternatives: USD(AT&L) or ASD(C3I), Joint Staff or PSA office, DOT&E, and Director, PA&E.

C4.3.4.4. Coordination shall ensure consideration of the full range of alternatives; the development of organizational and operational plans, with inputs from the Commanders in Chief of the Combatant Commands, that are consistent with U.S. military strategy; and the consideration of joint-service issues, such as interoperability, security, and common use. USD(AT&L) shall issue guidance for ACAT ID programs. USD(AT&L) or ASD(C3I) shall issue guidance for other programs. The Director, PA&E shall prepare the guidance in coordination with the offices listed above.

C4.3.5. Program Decision Points. Normally, the DoD Component completes the analysis and documents its findings in preparation for a program initiation decision. The MDA may direct updates to the analysis for subsequent decision points, if conditions warrant. For example, an analysis of alternatives may be useful in examining cost performance trades at the system demonstration interim progress review. An analysis of alternatives is unlikely to be required for Milestone C, unless there was no Milestone B; unless the program or circumstances (e.g., threat, alliances, operating areas, technology) changed significantly; or unless there are competing procurement strategies for the same system. For ACAT IA programs, the PM shall incorporate the analysis of alternatives into the cost/benefit element structure and process described in C4.5.2.

#### C4.4. AFFORDABILITY

Affordability is the degree to which the life-cycle cost of an acquisition program is in consonance with the long-range investment and force structure plans of the Department of Defense or individual DoD Components. The following procedures establish the basis for fostering greater program stability through the assessment of program affordability and the determination of affordability constraints:

C4.4.1. Components shall plan programs consistent with the DoD Strategic Plan, and based on realistic projections of likely funding available in the Future Years Defense Program (FYDP) and in years beyond the FYDP.

C4.4.2. DoD Component sponsors shall emphasize affordability early in the proposed program. The ORD (CJCS Instruction 3170.01B (reference(f))) shall address cost.

C4.4.3. The MDA shall assess affordability at each decision point. No acquisition program shall proceed into System Development and Demonstration unless sufficient resources, including manpower, are programmed in the most recently approved FYDP, or will be programmed in the next Program Objective Memorandum (POM), Budget Estimate Submission (BES), or President's Budget (Pub. L. 104-106 (1996) (reference(qqq)) and OMB Circular A-11 (reference(b))).

C4.4.4. Cost Analysis Improvement Group (CAIG) (see section C7.12.) reviews shall ensure that cost data supporting affordability judgments for ACAT I programs are accurate. The Cost/Performance IPT (see paragraph C7.6.6.) shall ensure that cost and benefit data supporting affordability judgments for ACAT IA programs are accurate.

C4.4.5. The manpower estimate for the program shall address manpower affordability in terms of military end-strength, civilian full-time equivalents, and contractor work years.

C4.4.6. Prior to submitting the POM or BES to the Secretary of Defense, the Heads of the DoD Components shall consult with USD(AT&L) or ASD(C3I), as appropriate, when the POM or BES contains a significant change in funding for, or reflects a significant funding change in, any program subject to Defense Acquisition Board (DAB) or DoD CIO review (DoD Directive 5134.1 (reference (rrr))).

#### C4.4.7. Full Funding

C4.4.7.1. When the DAB or Information Technology Overarching Integrated Product Team (IT OIPT) (see paragraph C7.6.4.) reviews a program, the Head of the DoD Component responsible for the program shall report the funding for the program, as contained in the most recent, Secretary of Defense-approved FYDP, to USD(AT&L) or ASD(C3I), as appropriate. The Head of the DoD Component shall describe the best possible acquisition strategy, given currently approved program funding. If the DoD Component prefers a different approach, the Head of the DoD Component shall describe the DoD Component preference, as well.

C4.4.7.2. If, after review, USD(AT&L) or ASD(C3I) concludes that the FYDP funding for the program will not support the program as presented, the Head of the DoD Component shall commit to incorporate appropriate funding in the next FYDP update.

### C4.5. RESOURCE ESTIMATES

C4.5.1. The PM shall prepare a life-cycle cost estimate (LCCE) for all ACAT I program initiation decisions and at all subsequent program decision points.

C4.5.1.1. OSD CAIG (see section C7.12.) shall prepare an independent LCCE and associated report for the decision authority for all ACAT ID programs, and for ACAT IC programs as requested by USD(AT&L), for all major decision points as specified in DoD Instruction 5000.2, enclosure 3 (reference (a)), or as directed by the MDA.

C4.5.1.2. The DoD Component cost agency shall prepare an independent LCCE and associated report for the decision authority for all ACAT IC programs, except those reviewed by the CAIG, for all major decision points as specified in DoD Instruction 5000.2, enclosure 3

(reference (a)), or as directed by the MDA. For programs with significant cost risk or high visibility, the CAE may request an additional DoD Component cost analysis estimate.

C4.5.1.3. For ACAT I programs, the MDA shall consider the independent LCCE before approving entry into system development and demonstration or into production and deployment (10 U.S.C. 2434 (reference(sss))).

C4.5.1.4. The DoD Component's manpower authority shall prepare a manpower estimate in support of program initiation for ACAT I programs. They shall update the estimate at subsequent milestones and the full-rate production decision review. The MDA shall consider the manpower estimate before approving entry into system development and demonstration and again before entry into production and deployment (10 U.S.C. 2434 (reference(sss))).

C4.5.1.5. For ACAT IA program initiation, the PM shall prepare a life-cycle cost and benefits estimate, often termed an economic analysis (EA). The EA shall consist of an LCCE and a life-cycle benefits estimate, including a return on investment (ROI) calculation (Pub. L. 104-106 (1996), Section 5123 (reference(e))). The MDA usually directs an update to the EA whenever program cost, schedule, or performance parameters significantly deviate from the approved APB.

C4.5.1.6. The PSA or sponsoring DoD Component shall ensure that the DoD Component also provides a cost analysis for all ACAT IA programs each time an EA is required. The DoD Component cost analysis is an independent estimate of life-cycle costs. The DoD Component may request a sufficiency review of the program office LCCE in lieu of conducting a full cost analysis. The MDA shall determine whether a sufficiency review is appropriate. If appropriate, the Cost WIPT shall establish the scope of the sufficiency review.

C4.5.1.6.1. PA&E shall assess the EA to determine the following:

C4.5.1.6.1.1. Reasonableness of the life-cycle cost and benefits estimates;

C4.5.1.6.1.2. Whether the cost, schedule, and performance goals are realistic;

C4.5.1.6.1.3. Reliability of the ROI calculation; and

C4.5.1.6.1.4. Traceability of the estimated benefits, as presented.

C4.5.1.6.2. PA&E shall provide results of the assessment to both the PM and MDA.

C4.5.1.6.3. For ACAT IA programs, the MDA shall consider the DoD Component cost analysis and PA&E assessment.

#### C4.5.2. Life-Cycle Cost Estimates (LCCEs)

C4.5.2.1. The estimating activity shall explicitly base the LCCE (or EA for ACAT IA programs) on program objectives; operational requirements; contract specifications; careful risk assessments; and, for ACAT I programs, a DoD program work breakdown structure (WBS), or, for ACAT IA programs, a life-cycle cost and benefit element structure agreed upon by the IPT. The LCCE (or EA) shall be comprehensive. It shall identify all cost elements, including operation and support costs, that affect the decision to proceed with development or production of the system, regardless of funding source or management control.

C4.5.2.2. The LCCE (or EA for ACAT IA programs) shall be consistent with the cost estimates in the analysis of alternatives, and shall explain major changes that may have occurred. It shall present a realistic appraisal of the level of cost most likely to be realized. The manpower estimates underpinning operation and support costs shall be consistent with the manpower estimate of section C4.5.4.2. The LCCE for ACAT IA programs shall include life-cycle benefits as well as life-cycle costs (Pub. L. 104-106 (1996), Section 5123 (reference(e)) and 44 U.S.C. 3506 (reference(c))).

C4.5.2.3. For an ACAT IA program, the PM shall develop and use the life-cycle benefits estimate portion of the EA to identify and project both mission and system benefits. Mission benefits include both quantitative monetary benefits, such as reduced operating costs; as well as non-monetary benefits, such as improved efficiency or functionality. System benefits also include both monetary and non-monetary benefits, such as reduced total ownership cost or higher reliability.

C4.5.3. Cost Analysis Requirements Description (CARD). For ACAT I programs, the DoD Component sponsoring the acquisition shall establish a CARD. The PM shall prepare, and an authority no lower than the DoD Component PEO, shall approve the CARD. For ACAT IA programs, the PM shall establish the CARD in coordination with appropriate IPT members. The CARD shall describe the salient features of both the acquisition program and the system itself, and provide the basis for the LCCEs. The CARD shall be flexible, tailored, and refer to information available in other documents available to cost estimators. For joint programs, the CARD shall cover the common program as agreed to by all participating DoD Components, as well as any unique, DoD Component requirements. The teams preparing the program office LCCE, the component cost analysis, if applicable, and the independent LCCE shall receive the CARD 180 days prior to a planned OIPT or DoD Component review, unless the OIPT leader agrees to another due date.

C4.5.4. Manpower. The DoD Components shall determine the most efficient and cost effective mix of government manpower and contract support for all systems. The DoD Components shall not contract for inherently governmental and exempted functions.

#### C4.5.4.1. Manpower Considerations

C4.5.4.1.1. For all programs regardless of acquisition category, DoD Components shall determine the source of support for all new, modified, and replacement systems based on the procedures, manpower mix criteria, and risk assessment instructions in Deputy Under Secretary of Defense (Program Integration), Office of the Under Secretary of Defense (Personnel & Readiness) (OUSD(P&R)), and Deputy Under Secretary of Defense (Installations), Office of USD(AT&L) annual memo, "DoD Inventory of Commercial and Inherently Governmental Activities Data Call." They shall consider the advantages of converting from one source to another (military, civilian, or private contract) (10 U.S.C. 129a (reference(ttt))), and the use of inter-service and intra-governmental support (DoD Instruction 4000.19 (reference(uuu))). The DoD Components shall competitively source support functions in accordance with DoD Directive 4100.15 (reference(vvv)) and DoD Instruction 4100.33 (reference(www)).

C4.5.4.1.2. The DoD Components shall determine manpower and contract support based on both peacetime and wartime requirements, and establish manpower authorizations at the minimum necessary to achieve specific vital objectives (DoD Directive 1100.4 (reference(xxx))). As part of this process, the DoD Components shall assess the risks (DoD Instruction 3020.37 (reference(yyy))) involved in contracting support for critical functions in-theater, or in other areas expecting hostile fire. Risk mitigation shall take precedence over cost savings in high-risk situations or when there are highly sensitive intelligence or security concerns.

#### C4.5.4.2. Manpower Estimate<sup>7</sup>

C4.5.4.2.1. The manpower estimate for ACAT I programs shall outline the DoD Component's official manpower position, and address whether the system is affordable from a military end-strength and civilian full-time equivalent (FTE) perspective. The DoD Component shall base manpower numbers on the level of system performance (e.g., reliability and maintainability) most likely to be achieved.

C4.5.4.2.2. The estimate shall report the total number of manpower requirements and authorizations needed to operate, maintain, support, and provide training for the system upon full operational deployment. It shall report the number of military (officer, warrant officer, and enlisted), DoD civilian manpower, and contract work-years for each fiscal year of the program, beginning with initial fielding and ending with system retirement/disposal. It shall indicate if there are any resource shortfalls in any fiscal year covered by the report. It shall state whether any increases in military end strengths or civilian FTEs (beyond what is included in the FYDP) or whether waiver(s) to existing manpower constraints is/are required to support full operational

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<sup>7</sup> Not applicable to ACAT IA programs.

deployment of the system. The estimate shall report Active, Reserve, and National Guard numbers separately. For joint programs, each DoD Component shall provide a separate estimate.

C4.5.4.2.3. The manpower estimate shall compare manpower requirements of the new system against the old or replaced system(s), if applicable. It shall address whether the new system meets or exceeds manpower objectives and thresholds in the ORD, if so established.

C4.5.4.2.4. The manpower estimate shall address whether there are any personnel issues that would adversely impact full operational deployment of the system. It shall clearly state the risks associated with and the likelihood of achieving manpower numbers reported in the estimate. It shall briefly assess the validity of the manpower numbers, stating whether the DoD Component used validated manpower methodologies and manpower mix criteria, and assessed all risks. The estimate shall address whether planned or recently completed manpower and personnel initiatives (e.g., reorganization, restructuring, or reengineering actions; or military occupational specialty consolidations), competitive sourcing initiatives (i.e., cost comparisons or direct conversions), or other actions could impact the manpower numbers.

C4.5.4.2.5. For ACAT ID programs, OUSD(P&R) shall review manpower estimates and provide comments to the OIPT.